



FOCUS

Developing Air Cleanup Standards under the Model Toxics Control Act

Background

The Washington Department of Ecology (Ecology) adopted changes to the Model Toxics Control Act (MTCA) Cleanup Regulation, chapter 173-340 WAC, on February 12, 2001. These changes became effective on August 15, 2001. This document provides an overview of the requirements and procedures for developing air cleanup standards under this revised regulation.

What is an air cleanup standard?

An air cleanup standard consists of a concentration (cleanup level) that must be met at a specified location within the air (point of compliance). It also includes any additional regulatory requirements that may be specified in applicable state or federal laws.

Is it necessary to establish air cleanup standards at all sites?

No. Unless the department specifically determines otherwise on a site-specific basis, air cleanup standards only need to be established at the following sites:

- ❖ Sites where a nonpotable ground water cleanup level is being established for volatile organic compounds using a site-specific risk assessment;
- ❖ Sites where a site-specific risk assessment is being used to establish a soil cleanup level and an air cleanup level is needed to assess exposure to vapors or dust; and
- ❖ Sites where it is necessary to establish an air toxics emission limit for a remedial action method with an air discharge (such as an incinerator).

Air cleanup standards are not required to address concentrations of contaminants in the air originating from an off-site source or from an industrial or commercial process or operation.

What land uses are air cleanup levels based on?

Air cleanup levels must be based on the reasonable maximum exposure expected to occur under both current and future site conditions. For most sites, air cleanup levels must be based on exposures associated with residential land uses. For qualifying industrial properties, and utility vaults and manholes, the air cleanup level may be based on exposures associated with industrial land uses (adult worker exposure).

What options are available for establishing air cleanup levels?

The regulation provides two methods for establishing air cleanup levels – **Method B** and **Method C** (see **Figure 1**). Both of these methods and the criteria for their use are described below. Note that the regulation does not provide for the establishment of Method A air cleanup levels.

When may Method B be used to establish air cleanup levels and how is a Method B cleanup level established?

Method B may be used to establish air cleanup levels at any site.

Method B is divided into two tiers: **Standard** and **Modified**. Under both standard and modified Method B (see **Figure 2**), the cleanup level is based on the most stringent of the following concentrations:

- ❖ **Concentrations established under applicable state and federal laws.** The cleanup level must be at least as stringent as the most stringent concentration established under applicable state and federal laws.
- ❖ **Concentrations that protect human health.** The cleanup level must be at least as stringent as concentrations that protect human health.

For hazardous substances for which sufficiently protective, health-based concentrations have been established under applicable state and federal laws, the most stringent of those concentrations is used. A concentration established under applicable state and federal laws is sufficiently protective if the excess cancer risk does not exceed 1 in 100,000 (1×10^{-5}) and the hazard quotient does not exceed one (1). If the concentration is not sufficiently protective, then either the concentration must be adjusted downward in accordance with WAC 173-340-750(5)(b) or a protective concentration must be calculated using the equations provided in the regulation.

For hazardous substances for which health-based concentrations have not been established under applicable state and federal laws, a protective concentration must be calculated using the equations provided in the regulation.

Under standard Method B, protective concentrations are calculated using the standard equations and default assumptions provided in the regulation (see **Table 1**). These equations and default assumptions ensure that it is safe for persons of all ages on the site to breathe the air while undertaking a wide range of physical activities.

Under modified Method B, specified default assumptions may be adjusted based on site-specific or chemical-specific data. The regulation describes which parameters may be adjusted and how they may be adjusted.

- ❖ **Concentration that does not exceed 10% of the lower explosive limit.** The cleanup level for a hazardous substance must be at least as stringent as a concentration that does not exceed 10% of the lower explosive limit for that substance or any mixture of hazardous substances.

When may Method C be used to establish air cleanup levels and how is a Method C cleanup level established?

Method C may be used to establish air cleanup levels only at certain sites. Specifically, Method C may be used at qualifying industrial properties, and for manholes and utility vaults. The criteria in WAC 173-340-745 are used to determine if a property qualifies for an industrial cleanup level. Method C may also be used to establish air cleanup levels at sites where it can be demonstrated that such levels comply with applicable state and federal laws, that all practicable methods of treatment have been used to minimize releases to the air, that institutional controls are in place, and that one or more of the following conditions exist:

- ❖ The Method B cleanup levels are below technically possible concentrations;
- ❖ The Method B cleanup levels are below area background concentrations; or
- ❖ The attainment of Method B cleanup levels has the potential for creating a significantly greater overall threat to human health or the environment than attainment of Method C cleanup levels.

Under Method C (see **Figure 3**), cleanup levels are established the same as under Method B, except that concentrations that are protective of human health are calculated using a less stringent target cancer risk for individual hazardous substances (1 in 100,000) and less stringent default exposure assumptions (see **Table 1**). These equations and default assumptions ensure that it is safe for an adult worker on the site to breathe the air while undertaking a wide range of physical activities.

Are there any special considerations for establishing air cleanup levels for petroleum mixtures?

Yes. Cleanup levels must be established for the total petroleum hydrocarbon (TPH) mixture as a whole as well as for individual hazardous substances (TPH components) within the mixture, such as benzene, ethylbenzene, toluene, and xylene.

The regulation does not provide for the establishment of Method A air cleanup levels. Consequently, cleanup levels for TPH and TPH components must be established using Method B or Method C (if applicable).

Under Method B and Method C, the cleanup levels for individual TPH components are established just like they would be for any other hazardous substance, as described above.

To establish site-specific TPH cleanup levels under Method B or C, the composition of the petroleum mixture in the air must be determined. Determining the composition requires the analysis of either the air or the source of the contamination (the product itself or contaminated soil or ground water) for petroleum fractions and other toxic components likely to be present. See Table 830-1 for a list of contaminants to test for when establishing cleanup levels for petroleum mixtures. If the analysis is based on the source of the contamination, a soil vapor composition must be predicted using a fate and transport model under WAC 173-340-747, such as the 3-phase or 4-phase model.

The actual or predicted air composition is used to calculate a total petroleum hydrocarbon (TPH) cleanup level that takes into account the combined noncarcinogenic effects of the petroleum mixture. This equation is not specified in the regulation. However, an acceptable

equation can be obtained from Ecology. This cleanup level may need to be adjusted downward to take into account the cleanup levels of any individual petroleum components.

Are there any additional considerations when establishing air cleanup levels?

Yes. Air cleanup levels may need to be adjusted either downward or upward based on the following additional considerations:

- ❖ **Downward adjustment based on total site risk:** Air cleanup levels for individual hazardous substances may need to be adjusted downward to take into account the additive health effects resulting from exposure to multiple hazardous substances and/or multiple exposure pathways. The cleanup levels need only be adjusted if the hazard index exceeds 1 or the total excess cancer risk exceeds 1×10^{-5} .
- ❖ **Downward adjustment to cleanup levels based on applicable state and federal laws:** Air cleanup levels based on applicable state and federal laws that exceed an excess cancer risk of 1×10^{-5} or a hazard index of 1 must be adjusted downward so that the total excess cancer risk does not exceed 1×10^{-5} and a hazard index of 1.
- ❖ **Upward adjustment based on natural background and PQL:** Air cleanup levels for individual hazardous substances must not be set below the practical quantitation limit (PQL) or natural background concentration, whichever is higher.

May the department establish more stringent cleanup levels?

Yes. The department may establish cleanup levels that are more stringent than those required under the applicable method when the department determines, based on a site-specific evaluation, that such levels are necessary to protect human health and the environment. The establishment of more stringent cleanup levels must comply with WAC 173-340-702 and 173-340-708.

Where do the air cleanup levels have to be met?

The “point of compliance” defines the point or points on a site where cleanup levels must be met. The term includes both “standard” and “conditional” points of compliance.

- ❖ **Standard point of compliance.** The standard point of compliance is defined as the ambient air throughout the site – both ambient outdoor air and air within structures.
- ❖ **Conditional point of compliance.** For qualifying industrial properties (see WAC 173-340-745), Ecology may approve a conditional point of compliance in the ambient air up to the property boundary provided the use of a conditional point of compliance would not pose a threat to human health or the environment.

What measurements are required to demonstrate compliance with the air cleanup levels?

When air cleanup levels have been established at a site to address emissions from contaminated soil or ground water, monitoring may be required to demonstrate compliance with cleanup levels. To address emissions from contaminated soil, the monitoring of vapors within the soil (using vapor probes) may be sufficient to demonstrate compliance. If this monitoring indicates soil vapors are above air cleanup levels, then it may be necessary to monitor the ambient air and air within structures to demonstrate compliance. Multiple samples may need to be collected to take into account spatial and seasonal variability in the air composition.

When air cleanup levels have been established at a site to address emissions from a remedial action, monitoring may be required to demonstrate compliance with cleanup levels. Such monitoring will usually consist of stack testing, coupled with modeling, to predict ground level concentrations. Ambient air monitoring may also be required where modeling indicates a potential violation of the air cleanup levels.

Statistical methods required under state and federal air quality law are to be used for analyzing the data. If no method exists in these laws, the appropriate statistical method will be determined on a case-by-case basis.

Note that concentrations attributable to an off-site source or from an industrial or commercial process or operation are not considered when determining compliance with air cleanup levels.

For More Information / Special Accommodation Needs

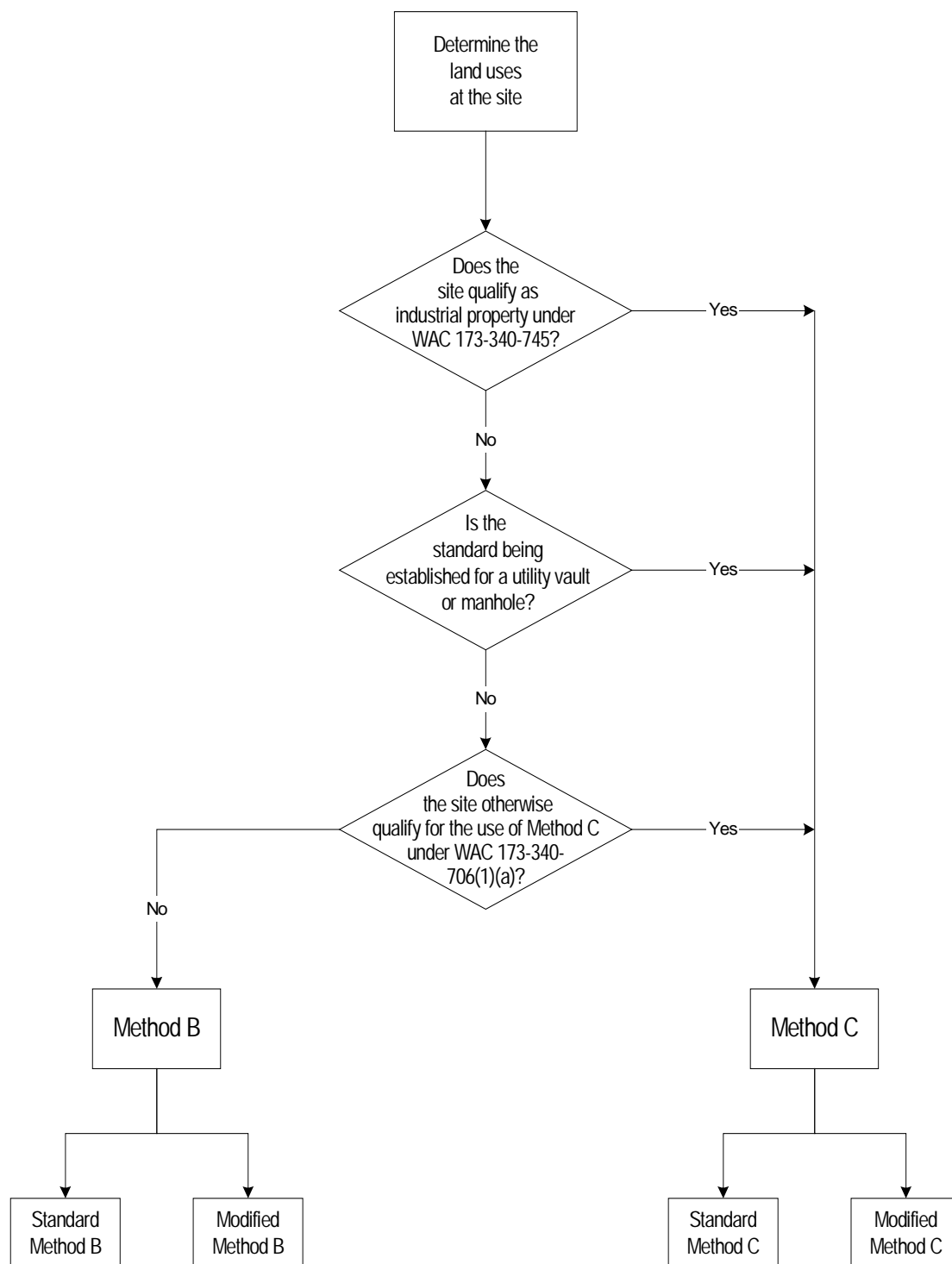
If you would like more information on setting cleanup standards or cleaning up sites, please call us toll-free at **1-800-826-7716**, or contact your regional Washington State Department of Ecology office listed below. Information about site cleanup, including access to a variety of technical guidance documents, is also accessible through our Internet address:

<http://www.ecy.wa.gov/programs/tcp/cleanup.html>.

- ❖ **Northwest Regional Office** **425/649-7000 (voice) / 206/649-4259 (TDD)**
(Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom Counties)
- ❖ **Southwest Regional Office** **360/407-6300 (voice) / 360/407-6306 (TDD)**
(Southwestern Washington, Olympic Peninsula, Pierce, Thurston and Mason Counties)
- ❖ **Central Regional Office** **509/575-2490 (voice) / 509/454-7673 (TDD)**
(Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima Counties)
- ❖ **Eastern Regional Office** **509/456-2926 (voice) / 509/458-2055 (TDD)**
(Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman Counties)

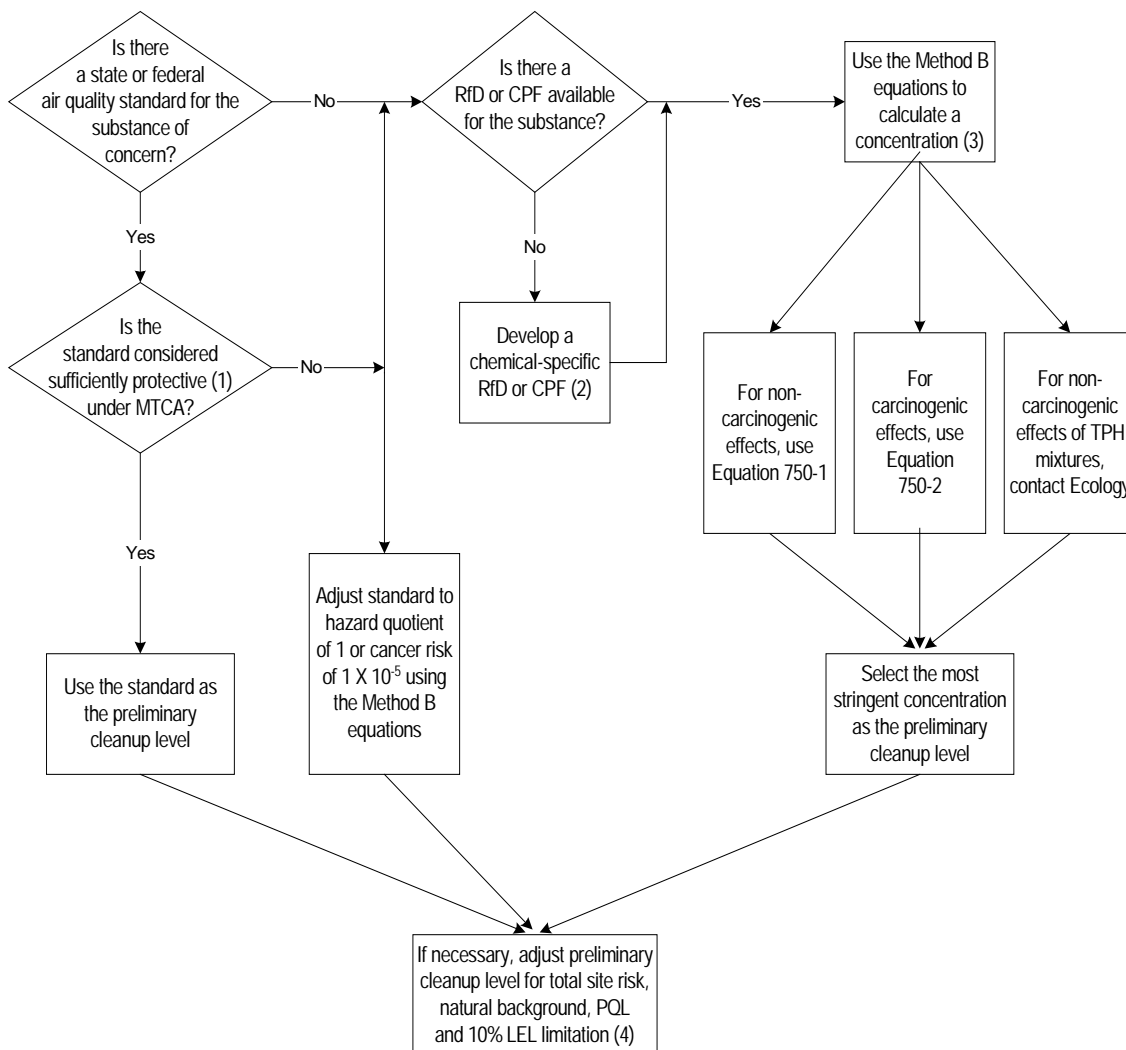
Disclaimer Notice: This document is intended to help the user understand WAC 173-340-750. It does not establish or modify regulatory requirements.

Figure 1: Options for Establishing Air Cleanup Levels under WAC 173-340-750



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Figure 2: Establishing Method B Air Cleanup Levels under WAC 173-340-750(3)



NOTES

(1) The standard must be based on a hazard quotient of 1 or less or a cancer risk of 1×10^{-5} or less. See WAC 173-340-750(5)(b). The Method B equations can be used to check for acceptable risk.

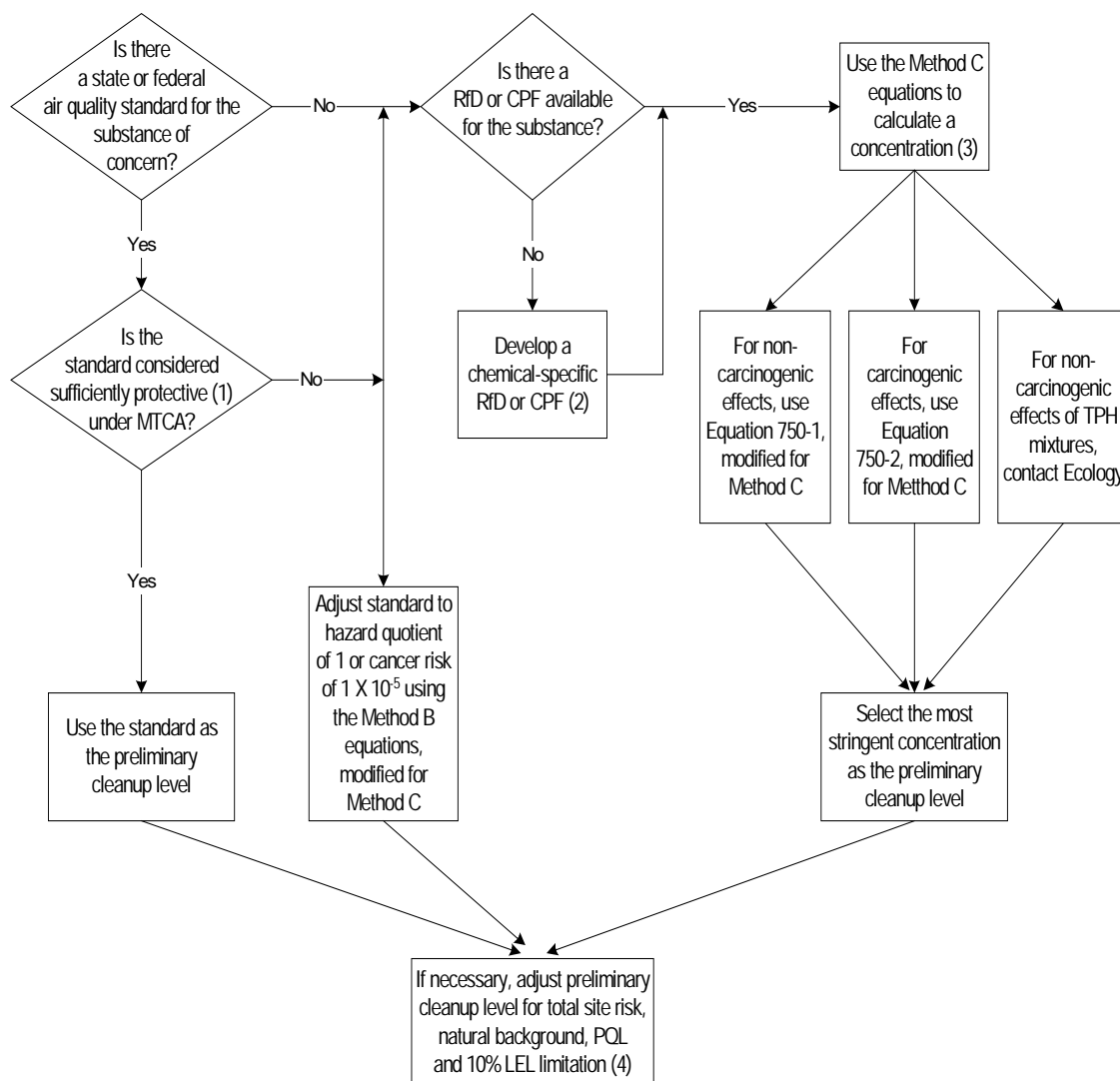
(2) Chemical-specific reference dose (RfD) or cancer potency factor (CPF) must be developed in consultation with Ecology, EPA, DOH and SAB. This process has been completed for RfDs for petroleum fractions and these values are available from Ecology.

(3) Use equations with default values for Standard Method B. Selected default values may be changed under Modified Method B. See WAC 173-340-750(3)(c).

(4) See WAC 173-340-750(5).

Disclaimer Notice: This figure is intended to help the user understand WAC 173-340-750. It does not establish or modify regulatory requirements.

Figure 3: Establishing Method C Air Cleanup Levels under WAC 173-340-750(4)



NOTES

(1) The standard must be based on a hazard quotient of 1 or less or a cancer risk of 1×10^{-5} or less. See WAC 173-340-750(5)(c). The Method B equations, modified for Method C, can be used to check for acceptable risk.

(2) Chemical-specific reference dose (RfD) or cancer potency factor (CPF) must be developed in consultation with Ecology, EPA, DOH and SAB. This process has been completed for RfDs for petroleum fractions and these values are available from Ecology.

(3) Use equations with default values for Standard Method C. Selected default values may be changed under Modified Method C. See WAC 173-340-750(4)(c).

(4) See WAC 173-340-750(5)(a).

Disclaimer Notice: This figure is intended to help the user understand WAC 173-340-750. It does not establish or modify regulatory requirements.

**Table 1: Summary of Default Values for Air Cleanup Level Equations
under WAC 173-340-750**

Factor	Method B ⁽¹⁾		Method C ⁽²⁾	
	Noncarcinogens	Carcinogens	Noncarcinogens	Carcinogens
Air Breathing Rate (BR)	10 m ³ /day	20 m ³ /day	20 m ³ /day	20 m ³ /day
Inhalation Absorption Fraction (ABS) (unitless)	1.0	1.0	1.0	1.0
Average Body Weight (ABW)	16 Kg	70 Kg	70 Kg	70 Kg
Exposure Duration (ED)	6 yrs	30 yrs	6 yrs	30 yrs
Averaging Time (AT)	6 yrs	75 yrs	6 yrs	75 yrs
Reference Dose (mg/kg-day)	See WAC 173-340-708(7)		See WAC 173-340-708(7)	
Cancer Potency Factor (kg-day/mg)		See WAC 173-340-708(8)		See WAC 173-340-708(8)
Noncarcinogenic Risk				
Hazard Quotient (HQ)	1		1	
Hazard Index (HI)	1		1	
Cancer Risk				
Single Substance		1 x 10 ⁻⁶		1 x 10 ⁻⁵
Total Risk		1 x 10 ⁻⁵		1 x 10 ⁻⁵

(1) For allowable modifications to these default values under Modified Method B, see WAC 173-340-730(3)(c).

(2) For allowable modifications to these default values under Modified Method C, see WAC 173-340-730(4)(c).